A MODEL OF CREATIVITY AND INNOVATION IN ORGANIZATIONS

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ABSTRACT

As a partial foundation for a descriptive model, a study is presented that broadly examined factors influencing creativity and innovation in organizations. Following this, a model of individual creativity is described and integrated into a preliminary model of organizational innovation. Four criteria for models of organizational innovation are set forth, criteria that the present model is designed to meet: (a) The entire process of individual creativity should be considered as a crucial element in the process of organizational innovation. (b) There should be an attempt to incorporate all aspects of organizations that influence innovation. (c) The model should show the major phases in the organizational innovation process. (d) The model should describe the influence of organizational factors on individual creativity. The model presented here is compared to and contrasted with previous models, and its limitations are discussed along with its implications for practice.

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In business, in the 1980s, it is impossible to get away from innovation. This is true in both a literal sense and a figurative sense. Literally, it is impossible to read business journals or newspapers, attend business conferences, or read annual reports without constantly hearing about the importance of innovation. Figuratively, it is impossible to escape the reality that corporations must be innovative in order to survive. Domestic and international competition, changing government regulations, and rapidly shifting market conditions demand constant and visionary innovation.

With all that has been said about innovation in the business media, and all that has been written about innovation by industrial researchers, we still lack a comprehensive model of how the process of innovation occurs and what influences it (cf. Delbecq & Mills, 1985; Saren, 1984). Certainly, there is a great deal of information about the innovation process currently available. And a number of researchers have proposed useful models that describe various aspects of the innovation process. Both researchers and practitioners need a model to encompass existing information and integrate previous models, for at least three reasons. First, a sound and complete model can stimulate further research, as well as channeling that research in the directions of greatest need for information. Second, a model can help us integrate and understand existing information. Third, if the model does fit well with current knowledge about innovation, it should be useful in guiding the practice of nurturing innovation.

Some of the information that I will draw on in formulating a preliminary model of organizational innovation comes from an interview study that I conducted with Stan Gryskiewicz (Amabile & Gryskiewicz, 1987). Our study was designed to answer some quite general questions: What influences creativity and innovation in work organizations? What is it about persons and their work environments that makes a difference? Our method involved asking all interviewees to tell us about two events from their work experience: one event that exemplified high creativity, and one that exemplified low creativity. Here is an illustrative excerpt from an interview with a Research and Development (R&D) scientist:

> I was working on the formation of emulsions. At the time, I had an office mate who was working on a different problem area. I keep pretty much to myself, and he got upset that I never told him anything about what I was doing. I said that there were lots of things I could tell him about, and I just picked one to satisfy his curiosity. Afterward, I got to thinking about that idea I'd picked, and realized that I was on to something there. The next thing I knew, I was in the lab working on it.

We asked our interviewees, in telling their stories, to describe both the person(s) involved in the event (including themselves, where appropriate) *and* the work environment surrounding the event. This scientist described himself in this way:

> I think of myself as someone who generally thinks along different directions than the average person. I'm always looking for the interesting twist that something might have. I'm not interested in the normal direction that a given piece of work might progress into; I am more interested in the variations, the deviations that might result.

And this is how the scientist described his work environment:

> I'm in a unique situation. For one thing, I generally get the funding I need. But, more importantly, my management has pretty much left me alone. I don't have a specific product area that I have to work on, specific deadlines, and so on. It is pretty much an exploratory area. I devise my own time commitments as I see necessary. I have a great deal of freedom. I don't have management standing over me giving me specific guidelines that I need to follow. Quite often I will be tinkering in something that management will have no interest in, yet when I start to develop it into something, there will be a lot of interest. If they had close reins on me, they would have killed a lot of projects at an early stage and nothing would have resulted.

This story illustrates a central phenomenon that appeared repeatedly in these interviews, a phenomenon that leads directly to the basic structure of the organizational innovation model I will present: individual creativity and organizational innovation are closely interlocked systems. Individual creativity is the most crucial element of organizational innovation, but it is not, by itself, sufficient. And features of the organization can be the most crucial determinants of an individual's creativity at any point in time. I will describe the results of this interview study because it examined, in a broad way, all factors that can potentially influence creativity and innovation in organizations. I will then present findings from my experimental studies of creativity, findings that led to a model of individual creativity. Finally, I will integrate all of these experimental and nonexperimental findings, along with the individual creativity model, into a preliminary model of organizational innovation.

Because no previous models of organizational innovation have prominently included the process of individual creativity or the factors that influence it, I will focus primarily on those elements. This, I believe, is the major contribution that my formulation has to offer.

DEFINITIONS

Because there is such a diversity in the use of the terms "creativity" and "innovation," it is necessary to begin with a clarification of the definitions I will use. Some researchers and theorists define creativity according to characteristics of the *person*. For example, in a recent theoretical analysis of creativity and innovation, Findlay and Lumsden (in press) say, "We will use the term *creativity* to refer to the constellation of personality and intellectual traits shown by individuals who, when given a measure of free

rein, spend significant amounts of time engaged in the creative process." Others have defined creativity according to the *process* itself: "[Creativity] is the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people, or circumstances of his life on the other" (Rogers, 1954). However, most theorists and researchers adopt a creativity definition focused on the *product:* "novelty that is useful" (Stein, 1974).

I agree that a product-oriented definition is most appropriate for present purposes. Because of complexities in observation and assessment, it is quite difficult to rely on either person or process measures in identifying creativity. Product measures are considerably more straightforward (cf. Amabile, 1982b). If we take individual ideas or products that can reliably be identified as creative by experts, then we can look at the person qualities, the environmental factors, and perhaps even the thought processes corresponding to the production of those ideas or products. Thus, the definition used here is based on products (ideas): *creativity is the production of novel and useful ideas by an individual or small group of individuals working together.*

Innovation is built on creative ideas as the basic elements. *Organizational innovation is the successful implementation of creative ideas within an organization.* Within this definition, the ideas in question can be anything from ideas for new products, processes, or services within the organization's line of business to ideas for new procedures or policies within the organization itself. The term "implementation" is used broadly here, to encompass elements of developing ideas and putting them to use. This definition is similar to many existing definitions of innovation, but with some points of distinction. Some definitions of innovation are quite close to definitions of creativity; they focus on the production of ideas, rather than the implementation. For example, Drucker (1985) defines systematic innovation as "the purposeful and organized search for changes," while Zaltman, Duncan, and Holbeck (1973) define it as "any idea, practice, or material artifact perceived to be new by the relevant unit of adoption."

However, most current definitions of innovation do include the development and implementation of new ideas. Van de Ven (1986) is quite explicit about the role of both the individual and the organization: "innovation is . . . the development and implementation of new ideas by people who over time engage in transactions with others within an institutional order" (p. 590). Kanter (1983) defines innovation as "the process of bringing any new, problem-solving idea into use . . . Innovation is the generation, acceptance, and implementation of new ideas, processes, products, or services." Each of these latter definitions of innovation (Kanter, 1984; Van de Ven, 1986), like those of other theorists (Findlay & Lumsden, in press; Myers & Marquis, 1969; West, Farr, & King, 1986; Zaltman et al., 1973) implicitly or explicitly includes the notion of creative (novel and useful) ideas being successfully implemented by a larger group.

THE INTERVIEW STUDY

The interview study actually includes a group of three studies, with three distinctly different subject populations. In the first (Amabile & Gryskiewicz, 1987), we interviewed 120 R&D scientists from over 20 different corporations. In the second, we interviewed 16 marketing and development employees of one of the nation's largest banks. And, in the third, we interviewed 25 marketing and sales employees of a major railroad. The question asked of all interviewees was basically the same. They were asked (with the question presented a few days before the actual interview) to tell us about an example of high creativity from their work experience. They were told to define creativity as they saw fit, and to relate as many details as they could remember about the event (without divulging any proprietary information). They were also told that they themselves need not be one of the central characters in the story, as long as they observed the event closely enough to be able to describe it in detail.

We told our interviewees that we were particularly interested in anything about the event that stood out in their minds—anything about the person or persons involved, and anything about the work environment.

Finally, we asked them to describe an event of the opposite type: one that exemplified low creativity. We felt that, by using this critical incident technique, we would be more likely to avoid the interjection of personal beliefs about creativity than if we simply asked interviewees what they thought was important for supporting or undermining creativity in organizations.

In our search for information about the major influences on creativity and innovation, we did a detailed content analysis of typed verbatim transcripts of these tape-recorded interviews (cf. Amabile & Gryskiewicz, 1987). The types of things our interviewees talked about fell into four major categories (here rank-ordered by frequency): Qualities of environments that promote creativity, Qualities of environments that inhibit creativity, Qualities of problem solvers that promote creativity, and Qualities of problem solvers that inhibit creativity. In our system, "Qualities of environments" are any factors outside of the problem solvers themselves (including other people) that appeared to consistently influence creativity positively, as in the high creativity stories, or negatively, as in the low creativity stories. "Qualities of problem solvers" are any factors of ability, personality, mood, etc., within the problem solvers themselves that seemed to consistently influence creativity either positively or negatively. We found that environmental factors were mentioned much more frequently

than personal qualities, in both the high and the low creativity stories. Because this finding appeared in both the high and low creativity stories, and because a large percentage of the stories did not involve the interviewee as a central character (problem solver), we feel that this preponderance of environmental factors cannot be dismissed as a simple attributional bias.

Does this mean that, in an absolute sense, environmental factors account for more of the variance in creative output than individual difference factors? Not necessarily, and not even probably. Certainly, at a gross level, personal factors such as general intelligence, experience in the field, and ability to think creatively are the major influences on output of creative ideas. But, assuming that hiring practices at major corporations select individuals who exhibit relatively high levels of these personal qualities, the variance above this baseline may well be accounted for primarily by factors in the work environment.

Because individual creativity appears as a central building block in the model of organizational innovation that I will present, I will begin with a consideration of factors within individuals that can influence creativity.

QUALITIES OF INDIVIDUALS THAT INFLUENCE CREATIVITY

Content analysis of the interview transcripts revealed 10 qualities of problem solvers that served to promote creativity, and 5 that served to inhibit creativity. I will present them here rank-ordered by the percentage of R&D scientists who mentioned them in their stories (see Amabile & Gryskiewicz, 1987). The same factors were found for both the bank and the railroad employees, although there was some reordering in the rankings.

Qualities of Problem Solvers That Promote Creativity

Note: Numbers in parentheses indicate the percentage of scientists who mentioned the factor at least once.

1. *Various Personality Traits* (41%): special qualities in the personality of the problem-solver, including persistence, curiosity, energy, and intellectual honesty. The positive personality traits that were mentioned in these interviews displayed a great deal of overlap with those uncovered in the work of previous creativity researchers (cf. Barron, 1968; MacKinnon, 1965; Stein, 1974; 1975).
2. *Self-motivation* (40%): being self-driven, excited by the work itself, enthusiastic, attracted by the challenge of the problem, having a sense of working on something important, and a belief in or commitment to the idea.
3. *Special Cognitive Abilities* (38%): special talents in the problem solver's particular field, as well as general problem-solving abilities and tactics for creative thinking.
4. *Risk-orientation* (34%): unconventional, attracted to challenge, oriented toward taking risks and doing things differently.
5. *Expertise in the Area* (33%): talent, experience, and acquired knowledge in the particular field.
6. *Qualities of the Group* (30%): synergy arising from the intellectual, personal, and social qualities of the individuals making up the project team.
7. *Diverse Experience* (18%): broad general knowledge and experience in a wide range of domains.
8. *Social Skill* (17%): good social and/or political skills, good rapport with others, being a good listener and a good team player, and being broad-minded or open to others' ideas.

9.5. *Brilliance* (13%): a high level of general intelligence.

9.5. *Naivete* (13%): being naive or new to the field, not biased by preconceptions or bound by old ways of doing things.

Qualities of Problem Solvers That Inhibit Creativity

Note: Numbers in parentheses indicate the percentage of scientists who mentioned the factor at least once.

1. *Unmotivated* (30%): lack of motivation for the work, not being challenged by the problem, having a pessimistic attitude toward the likely outcome; complacent, lazy.
2. *Unskilled* (24%): lack of ability or experience in the problem area.
3. *Inflexible* (22%): being set in one's own ways, opinionated, unwilling to do things differently, too constrained by one's education or training.
4. *Externally Motivated* (14%): being motivated primarily by money, recognition, or other factors aside from the work itself, responding primarily to restrictions and goals set by others, being competitive and jealous of someone else's success.
5. *Socially Unskilled* (7%): lack of social or political skills, such as being a poor team player.

A MODEL OF INDIVIDUAL CREATIVITY

Taken together, the list of 10 personal qualities that promote creativity and the list of 5 personal qualities that inhibit creativity can be viewed as a complete set of the personal factors influencing creativity in an orga-

nizational setting. These categories captured the information conveyed by scientists, bankers, and railroad employees, and we suspect that future data collection will not necessitate any radically different categories. Yet, informative as these lists may be, we need to unify them conceptually to answer the broad question, What basic factors of persons are necessary for creativity?

The lists of personal qualities derived from the interview study (Amabile & Gryskiewicz, 1987) fit well within a componential model of individual creativity developed from experimental research (Amabile, 1983a, 1983b). The componential model of creativity was designed to account for several well-established phenomena: the importance of talents, education, cognitive skills, interest patterns, and personality dispositions, all functioning interactively to influence creative behavior, as well as a motivational state marked by both deep involvement and intellectual playfulness. The model outlines three major components necessary for individual creativity in any particular domain: domain-relevant skills, creativity-relevant skills, and intrinsic task motivation.

Domain-relevant Skills

These are the basis from which any performance must proceed. Domain-relevant skills include factual knowledge, technical skills, and special talents in the domain in question. They comprise the individual's complete set of response possibilities—response possibilities from which the new response is to be synthesized and information against which the new response is to be judged. This component can be viewed as the set of cognitive pathways for solving a given problem or doing a given task. Some of the pathways are more common, well-practiced, or obvious than others, and the set of pathways may be large or small. The larger the set, the more numerous the alternatives available for producing something new, for developing a new combination of steps. As Newell and Simon (1972) poetically described it, this set can be considered the problem solver's "network of possible wanderings" (p. 82).

The interview study (Amabile & Gryskiewicz, 1987) revealed a number of personal qualities that can be grouped as elements within this component of domain-relevant skills: the positive characteristics of expertise in the specific area, brilliance, and certain of the special cognitive abilities, and (in opposite form) the negative characteristic of being unskilled. Broadly conceived, this component includes familiarity with and factual knowledge of the domain in question: facts, principles, attitudes toward various issues in the domain, knowledge of paradigms, performance "scripts" for solving problems in the domain, and aesthetic criteria. These labels are applicable in the most general sense. For example, "paradigms" may include anything

from formal scientific paradigms to traditional modes of operation in personnel management or standard techniques of advertising. And "aesthetic criteria" may include anything from standards for artistic merit to notions of what constitutes an elegant marketing strategy.

Domain-relevant skills constitute the individual's "raw materials" for creative productivity. Certainly, it is impossible to be creative in planning financial strategy unless one knows something (and probably a great deal) about the stock market, money markets, and current economic trends. In addition to basic knowledge, the component includes technical skills that may be required by a given domain, such as laboratory techniques or techniques for making etchings, and special domain-relevant talents such as an engineer's ability to visually imagine his or her designs. Domain-relevant skills appear to depend on innate cognitive, perceptual, and motor abilities, as well as on formal and informal education in the domain of endeavor.

Creativity-relevant Skills

Herein lies the "something extra" of creative performance. Assuming that an individual has some incentive to perform an activity, performance will be "technically good" or "adequate" or "acceptable" if the requisite domain-relevant skills are there. However, even with these skills at an extraordinarily high level, an individual will not produce creative work if creativity-relevant skills are lacking. Creativity-relevant skills include a cognitive style favorable to taking new perspectives on problems, an application of heuristics for the exploration of new cognitive pathways, and a working style conducive to persistent, energetic pursuit of one's work. The positive personal qualities from the interview study (Amabile & Gryskiewicz, 1987) that would fall within creativity-relevant skills are the various personality traits, risk orientation, qualities of the group, diverse experience, social skill, naivete, and certain of the special cognitive abilities. The negative personal qualities included (in opposite form) in this component are inflexibility and lack of social skill.

The cognitive-perceptual style most conducive to creativity appears to be characterized by a facility in understanding complexities and an ability to break mental set during problem solving. Some specific aspects of this cognitive-perceptual style include (cf. Amabile, 1983a): (a) breaking perceptual set; (b) breaking cognitive set, or exploring new cognitive pathways; (c) keeping response options open as long as possible; (d) suspending judgment; (e) using "wide" categories in storing information; (f) remembering accurately; and (g) breaking out of performance "scripts."

The creativity-relevant skills component also includes knowledge of heuristics for generating novel ideas. A heuristic can be defined as "any

principle or device that contributes to a reduction in the average search to solution" (Newell, Shaw, & Simon, 1962, p. 152), reduction over any blind or random process. Thus, a heuristic may be considered as a general strategy that can be of aid in approaching problems or tasks. Several theorists and philosophers of science have proposed creativity heuristics: (a) "When all else fails, try something counterintuitive" (Newell, et al., 1962); (b) "Make the familiar strange" (Gordon, 1961); (c) generate hypotheses by analyzing case studies, use analogies, account for exceptions, and investigate paradoxes (McGuire, 1973). Clearly, creativity heuristics are best considered as methods of approaching a problem that are most likely to lead to set-breaking and novel ideas, rather than as strict rules applied by rote. Although these heuristics may be stated explicitly by the person using them, they may also be known at a more implicit level and used without direct awareness.

The component of creativity-relevant skills also includes a work style conducive to creativity. For example, an ability to concentrate effort for long periods of time may be an important facet of such work style (Campbell, 1960; Hogarth, 1980), along with an ability to use "productive forgetting"—the ability to abandon unproductive search strategies and temporarily put aside stubborn problems (Simon, 1966).

Creativity-relevant skills depend on personality characteristics related to independence, self-discipline, ability to delay gratification, perseverance in the face of frustration, and an absence of conformity in thinking or dependence on social approval (Feldman, 1980; Golann, 1963; Hogarth, 1980; Stein, 1974). In addition, though, creativity-relevant skills depend on training, through which they may be explicitly taught, or simply on experience with idea generation, through which an individual may devise his or her own strategies for creative thinking. A great deal of previous research has investigated these elements, including work on creativity-training programs, such as brainstorming (Osborn, 1963) and synectics (Gordon, 1961), and research on the "creative personality" (e.g., Barron, 1955; Cattell & Butcher, 1968; MacKinnon, 1962; Wallach & Kogan, 1965).

Intrinsic Task Motivation

The prominence of motivational factors in the personal qualities uncovered by the interview study (Amabile & Gryskiewicz, 1987) is quite striking. Among the personal qualities that enhance creativity, self-motivation (mentioned by 40% of the interviewees) was second only to the collection of various personality traits (mentioned by 41%). And of the five personal qualities that inhibit creativity, two concerned motivation: being unmotivated (ranked first) and being externally motivated (ranked fourth). Clearly, in the events described by the scientists, motivation of

the problem-solvers accounted for a great deal of the difference between successful and unsuccessful attempts at creativity.

Motivation is the component of individual creative performance that has been most neglected by creativity researchers, theorists, and practitioners. Yet, in some ways, this may be the most important component. No amount of skill in the domain or in methods of creative thinking can compensate for a lack of appropriate motivation to perform an activity. But, to some extent, a high degree of proper motivation *can* make up for a deficiency of domain-relevant skills or creativity-relevant skills. Task motivation makes the difference between what an individual *can* do and what one *will* do. The former depends on the level of domain-relevant skills and creativity-relevant skills. But it is task motivation that determines the extent to which domain-relevant skills and creativity-relevant skills will be fully and appropriately engaged in the service of creative performance.

There is another reason for the importance of the motivational component in individual creativity. As I will show from both the interview study and several experimental studies, task motivation appears to depend strongly on the work environment; it may vary not only from one domain to another but from one task to another within a domain, depending on the work environment. Thus, motivation may simply be the most straightforward component to address in attempts to stimulate creativity. Relatively subtle changes in the work environment can make possible substantial increases in individual creativity.

Within the componential model, task motivation includes two elements: the individual's baseline attitude toward the task, and the individual's perceptions of his or her reasons for undertaking the task in a given instance. A baseline attitude toward the task is simply the person's natural inclination toward or away from activities of that sort. Because this attitude is the person's liking or disliking for a *particular* task, we can distinguish it from general overall job satisfaction. The two extremes of baseline task attitudes are captured in remarks made by participants in the interview study. The high end is described by the positive "self-motivation" factor: being self-driven, excited by the work itself, enthusiastic, attracted by the challenge of the problem, having a sense of working on something important, and a belief in or commitment to the idea. The negative extreme is described by the "unmotivated" factor: lack of motivation for the task; not being challenged by the particular problem; having a pessimistic attitude toward the likely outcome; complacency; laziness. Certainly, there are vast individual differences in baseline motivation levels for any given task. While one person might be enthusiastic and excited by the work involved in a particular task, another person, in the same environment, might simply find that task uninteresting.

The second element of task motivation is the individual's perception of his or her reasons for undertaking the task in a given instance. Perceptions of one's own motivation appear to depend largely on external social and environmental factors—the presence or absence of salient extrinsic constraints in the work environment. Extrinsic constraints are external factors intended to control or seen as controlling the individual's performance on the task in a particular instance. As such, the constraint is extrinsic to the work itself; it is not an essential feature of task performance, but it is introduced by the social environment. A salient extrinsic constraint is one whose controlling implications are clear to the individual during task engagement. The negative impact of extrinsic motivators appears in the interview study as the "externally motivated" factor: being motivated primarily by money, recognition, or other factors aside from the work itself, responding primarily to restrictions and goals set by others, being competitive and jealous of someone else's success. Each of these elements describes an extrinsic motivation, and each was linked to low creativity in the stories told by our interviewees.

In addition to external constraints, internal factors, such as a person's ability to cognitively minimize the salience of such extrinsic constraints or turn them into personal challenges, might also influence the self-perception of motivation. The final level of task motivation in a particular instance thus varies from the baseline level of intrinsic motivation as a function of extrinsic constraints that may be present in the situation *and* the individual's strategies for dealing with these constraints.

In summary, an individual can have no motivation for doing a task, a primarily intrinsic motivation (doing the task out of intrinsic interest), or a primarily extrinsic motivation (doing the task under some extrinsic constraint or motivator). Individuals who begin with an intrinsic motivation (at least some baseline interest in a task) can have that motivation undermined and changed to extrinsic motivation by the imposition of salient extrinsic constraints (cf. Deci, 1975; Deci & Ryan, 1985; Lepper & Greene, 1978). As I will discuss at greater length, a central tenet of the componential theory of creativity is that intrinsic task motivation is essential for individual creativity.

Intrinsic Motivation Experiments

Over the past few years, a number of studies have shown that extrinsic constraints in the work environment can indeed undermine individual creative performance. They have demonstrated the negative impact of constraints as varied as evaluation, surveillance, reward, competition, and restricted choice (e.g., Amabile, 1979; 1982a; Amabile & Gitomer, 1984; Amabile, Goldfarb, & Brackfield, 1982; Amabile, Hennessey, & Grossman, 1986; Koestner, Ryan, Bernieri, & Holt, 1984; Kruglanski, Friedman, & Zeevi, 1971; McGraw & McCullers, 1979). The componential model proposes that any of a wide variety of extrinsic constraints will, by impairing intrinsic motivation, have detrimental effects on creative performance.

One of my own studies clearly demonstrates that motivational orientation—intrinsic or extrinsic—can have a significant impact on creativity (Amabile, 1985). This study was designed to directly create an extrinsic motivational state in some subjects, without going through the intermediate step of imposing an extrinsic constraint. And the same method was used to directly create an intrinsically motivated state in other subjects. For this purpose, we borrowed a technique from Gerald Salancik (1975). We asked subjects to complete a questionnaire about their attitudes toward the target creativity task (writing). Some were given an "intrinsic questionnaire"; all of the items dealt with the intrinsically interesting aspects of the activity. Other subjects completed an "extrinsic questionnaire," which dealt with only extrinsic reasons for doing the activity. The purpose of the questionnaire was simply to lead subjects to think about the activity in intrinsic terms or in extrinsic terms. Then, immediate effects of this intrinsic or extrinsic orientation could be directly observed.

It was important in this study to find subjects who were already involved in this type of creative activity on a regular basis so that we might temporarily influence their orientation toward that activity. To this end, we recruited creative writers, using advertisements such as this: "Writers: If you are involved in writing, especially poetry, fiction, or drama, you can make three dollars for about an hour of your time. We are studying people's reasons for writing."

Most of those who responded to the ad were undergraduate or graduate students in English or creative writing at Brandeis University or Boston University, although a few were not affiliated with any university. The most important characteristics of these participants, for our purposes, is that they identified themselves as *writers*—they came to us with a high level of involvement in writing.

We had some additional criteria for choosing participants from those answering our ad; subjects had to answer "yes" to one or more of the following: (a) completion of one or more advanced creative writing courses, (b) publication of one or more works of poetry, (c) publication of one or more works of fiction or drama, (d) spending an average of four or more hours of their own time per week writing poetry, fiction, or drama. The average response to the last question was 6.3 hours, with a range of 3 to 18. Obviously, this group did consist of people who were committed to creative writing.

The basic idea of this study was to have each writer come to the lab-

oratory individually and, once there, to complete a questionnaire on "Reasons for Writing"—reasons for being involved in writing. (Some subjects, in a control condition, did not complete any questionnaire.) The questionnaire would either present only intrinsic reasons for writing or only extrinsic reasons, leading the writer to concentrate on either intrinsic or extrinsic motives for writing. Then, all of the writers would be asked to write a brief poem, which could later be judged by an expert-assessment technique (cf. Amabile, 1982b). In this way, we could look at the effects of temporary motivational orientation on creativity.

We wanted to present our subjects with items about writing that were as purely intrinsic or as purely extrinsic as possible. To get such items, we generated an initial list of 30 reasons for writing and asked a group of undergraduates at Brandeis to identify each reason as intrinsic, extrinsic, or neither/both, according to explicit definitions of intrinsic and extrinsic motivation. Seven of the reasons were consistently identified as intrinsic:

1. You get a lot of pleasure out of reading something good that you have written.
2. You enjoy the opportunity for self-expression.
3. You achieve new insights through your writing.
4. You derive satisfaction from expressing yourself clearly and eloquently.
5. You feel relaxed when writing.
6. You like to play with words.
7. You enjoy becoming involved with ideas, characters, events, and images in your writing.

Seven other reasons were consistently rated as extrinsic:

1. You realize that, with the introduction of dozens of magazines every year, the market for freelance writing is constantly expanding.
2. You want your writing teachers to be favorably impressed with your writing talent.
3. You have heard of cases where one bestselling novel or collection of poems has made the author financially secure.
4. You enjoy public recognition of your work.
5. You know that many of the best jobs available require good writing skills.
6. You know that writing ability is one of the major criteria for acceptance into graduate school.
7. Your teachers and parents have encouraged you to go into writing.

The introductory paragraph on the two questionnaires was identical. This introduction informed the writers that, in order to study their reasons

for being involved in writing, we wanted them to rank-order the seven reasons in order of importance to them. After rank-ordering either the intrinsic reasons or the extrinsic reasons (depending on their condition), the writers were asked to write a short poem where the first and last lines consisted of the single word "Laughter." (Those in the control group were simply asked to write the poem, without completing any questionnaire at all.)

After the study was complete, we asked several poets to judge these poems, using a procedure established in earlier research (cf. Amabile, 1982b, 1983a). The results were quite dramatic. As might be expected, the writers in the control group wrote poems that were judged fairly high on creativity; these were, after all, creative writers. The writers in the intrinsic group wrote poems that were judged as somewhat higher in creativity than those in the control group, but the difference was not large. The most important result comes from the extrinsic group. Those writers produced poems that were judged as much lower in creativity than the poems produced by either of the other groups.

Consider the implications of this study for "real world" work environments. These writers entered our laboratory with an intrinsic motivational orientation toward writing. Apparently, we were not able to increase that intrinsic orientation much; the creativity of the intrinsic group isn't notably higher than the creativity of the control group. On the other hand, with a terribly brief and simple manipulation, we significantly reduced the creativity of writers in the extrinsic group. People who had been writing creatively for years, who had long-standing interests in creative writing, suddenly found their creativity blocked after spending barely five minutes thinking about the extrinsic reasons for doing what they do. (A note about the ethics of this experiment: We fully debriefed all of our participants before they left the lab, and we had all of the extrinsic subjects fill out the intrinsic questionnaire at the end of their experimental sessions.)

If such a brief and subtle written manipulation could have such a significant impact on the creativity of highly motivated individuals, consider the potential effects of extrinsic constraints in everyday work environments on the creativity of people who find themselves in those environments every day.

Stages of the Individual Creative Process

The three components of domain-relevant skills, creativity-relevant skills, and task motivation are the building blocks for the componential model of creativity. The model is, conceptually, a multiplicative one: each of the components is necessary for some level of creativity to be produced; the higher the level of each of the three components, the higher the overall level of creativity should be.

The three components appear to operate at different levels of specificity. Creativity-relevant skills operate at the most general level; they may influence responses in any content domain. Thus, some highly creative individuals do indeed appear to be creative "types," in the sense that they produce unusual responses in many domains of behavior. Domain-relevant skills operate at an intermediate level of specificity. This component includes all skills relevant to a general domain, such as mathematical reasoning, rather than skills relevant to only a specific task within a domain, such as devising an equation to describe the motion of a certain space satellite. Obviously, within a particular domain, skills relevant to any given specific task will overlap with skills relevant to any other task. Finally, task motivation operates at the most specific level. In terms of impact on creativity, motivation may be very specific to particular tasks within domains, and may even vary over time for a particular task.

How do these building blocks figure into the overall process of individual creativity? Figure 1 presents a schematic representation of the componential model of the creativity process (Amabile, 1983a; 1983b). This model describes the way in which an individual might assemble and use information in attempting to arrive at a solution, response, or product. In information-processing terms, task motivation is responsible for initiating and sustaining the process; it determines whether the search for a solution will begin and whether it will continue, and it also determines some aspects

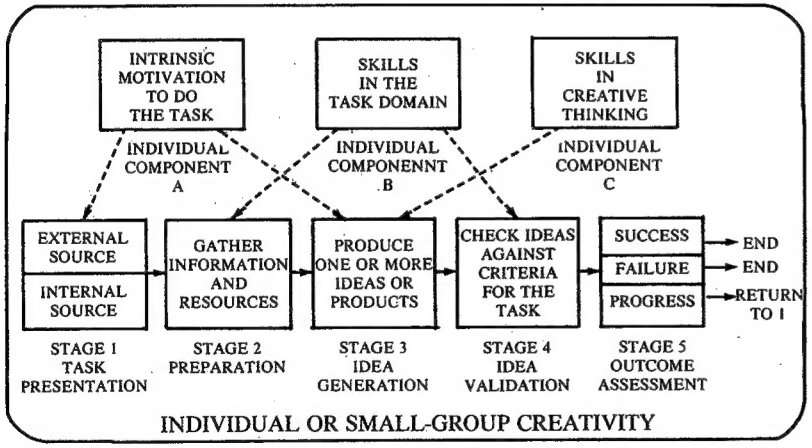

Figure 1. Componential model of individual creativity. Broken lines indicate the influence of particular factors on others. Solid lines indicate the sequence of steps in the process. Only direct and primary influences are depicted here. (From Amabile, 1983a).

of response generation. Domain-relevant skills are the materials drawn on during operation. They determine what pathways will be searched initially and what criteria will be used to assess the response possibilities that are generated. Creativity-relevant skills act as an executive controller; they can influence the way in which the search for responses will proceed.

This model resembles previous theories of creativity in the specification of the stages of problem presentation, preparation, response generation, and response validation (e.g., Wallas, 1926; Hogarth, 1980; Nystrom, 1979)—although there are a number of variations on the exact number and naming of stages in the sequence. This model is more detailed than previous ones, however, in its inclusion of the impact of each of the three components of creativity at each stage in the process (although only primary influences are depicted in the figure).

The process outlined in Figure 1 applies to both high and low levels of creativity; the level of creativity of a product or response varies as a function of the levels of each of the three components. Each component is necessary, and no one component is sufficient for creativity in and of itself. Thus, although this framework cannot be considered a detailed mathematical model of the creative process, it is conceptually, as noted earlier, a multiplicative model. No component may be absent if some recognizable level of creativity is to be produced, and the levels of all of the components together determine the final level of creativity achieved.

The initial step in this sequence is the presentation of the task or the problem. Task motivation has an important influence at this stage. If the individual has a high level of intrinsic interest in the task, this interest will often be sufficient to begin the creative process. Under these circumstances, the individual, in essence, poses the problem to himself. In other situations, however, the problem is presented by someone else. The problem might, of course, be intrinsically interesting under these circumstances, as well. However, it is likely that, in general, an externally posed problem is less intrinsically interesting to the individual. Certainly, in most organizational settings, externally posed problems are more common than internally posed ones.

The second stage is preparatory to the actual generation of responses or solutions. At this point, the individual builds up or reactivates a store of information relevant to the problem or task, including a knowledge of response algorithms for working problems in the domain in question. In the case where domain-relevant skills are rather impoverished at the outset, this stage may be quite a long one during which a great deal of learning takes place. On the other hand, if the domain-relevant skills are already sufficiently rich to afford an ample set of possible pathways to explore during task engagement, the reactivation of this already-stored set of information and algorithms may be almost instantaneous.

Note one important implication of this model: contrary to some popular beliefs, it is not possible to have *too much* knowledge about a task domain. According to these popular beliefs, people who have the smallest knowledge base in a domain are able to produce the most creative ideas. Certainly, people who are new to a field often do exhibit a higher level of creativity than those who have a longer work history. But it is clear from empirical research (e.g., Findlay & Lumsden, in press; Simon, 1983) that the important distinction is not the *amount* of knowledge, but the way in which that knowledge is stored and the ease with which it can be accessed. If information is stored according to rigid algorithms (which may be more likely for an old-timer than a new arrival), creativity is less probable. But if information is stored in wide categories with easy access of association, increased information should only lead to increased creativity. It is not possible to have too much knowledge; it *is* possible to have too many algorithms.

The novelty of the product or response is determined in the third stage. Here, the individual generates response possibilities by searching through the available pathways and exploring features of the environment that are relevant to the task at hand. Both creativity-relevant skills and task motivation play an important role at this stage. The existing repertoire of creativity-relevant skills determines the flexibility with which cognitive pathways are explored, the attention given to particular aspects of the task, and the extent to which a particular pathway is followed in pursuit of a solution. In addition, creativity-relevant skills can influence the subgoals of the response-generation stage by determining whether a large number of response possibilities will be generated through a temporary suspension of judgment. Finally, and (I will argue) most importantly, if task motivation is intrinsic rather than extrinsic, it can add to the existing repertoire of creativity-relevant skills a willingness to take risks with this particular task and to notice aspects of the task that might not be obviously relevant to attainment of a solution.

Domain-relevant skills again figure prominently in the fourth stage—the validation of the response possibility that has been chosen on a particular trial. Using domain-relevant techniques of analysis, the response possibility is tested for correctness or appropriateness against the knowledge and the relevant criteria included within domain-relevant skills. Thus, it is this stage that determines whether the product or response will be appropriate, useful, correct, or valuable—the second response characteristic that, together with novelty, is essential for the product to be considered creative according to the conceptual definition of creativity.

The fifth stage represents the decision-making that must be carried out on the basis of the test performed in stage 4. If the test has been passed perfectly, if there is complete attainment of the original goal, the process terminates. If there is complete failure, if no reasonable response possibility has been generated, the process will also terminate. If there is some progress toward the goal, if at least a reasonable response possibility has been generated (or if, in Simon's [1978] terms, there is some evidence of "getting warmer"), the process returns to the first stage, where the problem is once again posed. In any case, information gained from the trial is added to the existing repertoire of domain-relevant skills. If intrinsic task motivation remains sufficiently high, another trial will be attempted, perhaps with information gained from the previous trial being used to pose the problem in a somewhat different form. If, however, task motivation drops below some critical minimum, the process will terminate.

For complex tasks, the application of this model to the production of creative responses also becomes complex. Work on any given task or problem may involve a long series of loops through the process, until success in a final product is achieved. Indeed, work on what seems to be one task may actually involve a series of rather different subtasks, each with its own separate solution. And, of course, the sequence represented in Figure 1 is an idealized one. In actuality, for example, an individual may attempt to generate solutions, have difficulty, go immediately back to the preparation stage to gather more information, and then continue on with idea generation.

The kinds of creative tasks that people tackle in organizations very often demand the concerted efforts of a small group of individuals working very closely together, rather than the idea generation of a single worker. For this reason, we should examine the appropriateness of applying the individual creativity model to small groups, considering the group as an entity similar to the mind of one individual. Anecdotal reports from persons who have worked in close groups on creative projects suggest that it may, in fact, be reasonable to treat the individual process and the small-group process as similar. The most important reason for this is the common difficulty these persons have in separating out the individual idea contributions, especially in stage 3 of the process. They often report that ideas begin in one form, then go through several stages of modification, addition, and amplification by group members, often in a very brief period of time. Moreover, groups appear to go through the same process stages that individuals do. A problem is presented to the group (or group members decide on their own problem to tackle); they must do preparatory work, pooling the domain-relevant resources of individuals in the group; they generate ideas both alone and together; they work through these ideas, critiquing them and choosing among them; they assess the outcome. Thus, although it is certainly possible to consider each individual in a small group as going through his or her own creative process, it also makes sense to consider small, close groups as going through a similar process together.

The Feedback Cycle

The outcome of one cycle of the individual creative process can directly influence task motivation, thereby setting up a feedback cycle through which future engagement in the same or similar tasks can be affected. If complete success has been achieved, there will be no motivation to undertake exactly the same task again, because that task has truly been completed. However, with success, intrinsic motivation for similar tasks within the domain should increase. If complete failure has occurred—if no reasonable responses were generated—intrinsic motivation for the task should decrease. If partial success has been met, intrinsic motivation will increase when the problem solver has the sense of getting warmer in approaching the goal. However, it will decrease when the outcome of the test reveals that the problem solver is essentially no closer to the goal than at the outset.

Harter's theory of "effectance motivation" (1978) suggests this influence of process outcome on task motivation. Harter built on White's (1959) definition of the "urge toward competence," a definition proposing a motivational construct "which impels the organism toward competence and is satisfied by a feeling of efficacy" (Harter, 1978, p. 34). According to Harter's theory, failure at mastery attempts leads eventually to decreases in intrinsic motivation striving for competence. However, success (which will be more probable, the higher the level of skills), leads to intrinsic gratification, feelings of efficacy, and increases in intrinsic motivation, which, in turn, lead to more mastery attempts. In essential agreement with Harter, a number of social-psychological theorists (e.g., Deci & Ryan, 1985) have proposed that success (confirmation of competence) leads to increased intrinsic motivation.

Through its influence on task motivation, outcome assessment can also indirectly affect domain-relevant and creativity-relevant skills. A higher level of intrinsic task motivation may make set breaking and cognitive risk taking more probable and more habitual, thereby increasing the permanent repertoire of creativity skills. Also, a higher level of motivation may motivate learning about the task and related subjects, thereby increasing domain-relevant skills.

The Motivation-Response Generation Link

My own experimental research most clearly illuminates the link between intrinsic task motivation and stage 3 of the creative process—the idea-generation stage. That research (some of which I reviewed earlier) can be summarized in *The Intrinsic Motivation Principle of Creativity:* People will be most creative when they feel motivated primarily by the interest, enjoyment, satisfaction, and challenge of the work itself—and not by external pressures. That is, people who are primarily intrinsically motivated will be more likely to generate truly creative ideas than people who are primarily extrinsically motivated. I believe that this link between motivation and individual creativity, though often neglected in research and in practice, is extremely important. Because attention to this issue is so new, we are only beginning to gather information on *how* motivational state has an impact on creative performance. Why should motivation make a difference? What might be the mechanism whereby intrinsic motivation leads to higher levels of creativity than extrinsic motivation?

Within an organizational setting, most tasks on which creativity can be shown can be done either in a relatively algorithmic way (by relying on well-worn, familiar methods) or a relatively heuristic way (by exploring new methods). McGraw (1978) suggests, with considerable empirical evidence to back him up, that extrinsic motivation is most appropriate to algorithmic problem solving, and intrinsic motivation is most appropriate to heuristic problem solving. As far as problem-solving mechanisms are concerned, Campbell (1960) suggests that heuristic problems are solved by a more or less blind, random process. Certainly, the search can be narrowed down by various methods. Campbell proposes that the more possibilities there are to be explored, and the better the strategies for exploring them rapidly, the greater the likelihood of producing a novel yet appropriate response. Finally, in considering problem-solving strategies, Simon and his colleagues have theorized directly about the link between motivation and response generation. Simon (1967) postulates that the most important function of motivation is the control of attention. He proposes that motivation determines which goal hierarchy will be activated at any given time, and suggests that the more intense the motivation to achieve an original goal, the less attention will be paid to aspects of the environment that are irrelevant (or seemingly irrelevant) to achieving that goal. But attention to seemingly irrelevant aspects might be precisely what is required for creativity. For a creative response to be produced, it is often necessary to "step away" temporarily from the perceived goal (Newell et al., 1962), to direct attention toward seemingly "incidental" aspects of the task and the environment.

All of this leads to the proposition that motivational state affects creativity by influencing the likelihood that alternative—and potentially more creative—response possibilities will be explored during task engagement. The more single-mindedly an external goal is pursued, the less likely it will be that creative response possibilities will be explored. An extrinsic motivation is one in which the individual is motivated primarily by the extrinsic goal, and not by the intrinsic aspects of the task itself. It is precisely under these conditions that the external goal will be most single-mindedly pursued, and that creativity will be least likely. It is under these

conditions that the creativity heuristics of exploration, set breaking, and risk taking are least likely to be used.

Recall the statement about the mechanisms of creativity from the scientist quoted earlier. He said, "I'm always looking for the interesting twist that something might have. I'm not interested in the normal direction that a given piece of work might progress into." His words suggest a metaphor for the mechanism by which motivational state affects creative response generation. Imagine that a task or activity is a maze that an individual or group must find its way out of. From the starting point, there is often a clear, well-worn, and straight path to the outside; all that must be done to reach an exit is to proceed down that path. This is the "normal direction" that the scientist spoke of. The exit so reached *is* an acceptable way out; it is an acceptable solution. At the same time, however, it is not new; it is not particularly exciting or elegant; it is not creative.

There may well be other exits from the maze, exits that would provide more novel, exciting, and elegant solutions; in other words, there are more creative ways out of the maze. But those exits cannot be reached by following the well-worn pathway. They can only be reached by exploration, and by taking the risk of running into a dead end here and there. These exploratory pathways are the scientist's "interesting twists."

Someone who is extrinsically motivated is motivated primarily by something *outside* of the maze, the extrinsic goal. Since that goal can only be achieved once the maze has been exited, the best strategy for the extrinsically motivated person is to take the safest, surest, and fastest way out of the maze: the well-worn pathway, the uncreative route.

Someone who is intrinsically motivated, on the other hand, is motivated primarily by the interest, challenge, and enjoyment of *being in the maze*. Surely, there is no point in being in the maze if there is no desire to exit, to find a solution. Indeed, there may be a strong desire to exit, often caused by external factors (such as the dire need of the organization for a solution to this problem, or strong competition from other organizations who are trying to achieve the same thing). But the important distinction between intrinsic and extrinsic motivation arises from both the individual's basic interest in the activity and the amount of freedom from extrinsic constraint in the immediate work environment. The intrinsically motivated person, because enjoyment of being in the maze is so high and concern about extrinsic pressures is so low, will be more likely to spend the cognitive energy exploring the maze. Moreover, that person will not be overly concerned about the possible dead-end risks involved, but will see these dead-ends as opportunities for using the "getting warmer" strategies that Simon (1978) describes. Thus, it is only when two conditions occur together that an individual is likely to produce truly creative solutions: (a) the individual finds the task intrinsically interesting or personally challenging,

and (b) that individual is working in an environment that does not swamp intrinsic motivation with extrinsic constraints.

The Functions of Intrinsic and Extrinsic Motivation

But aren't there conditions under which strong extrinsic constraints are absolutely necessary? Isn't it both impossible and undesirable to completely wipe out extrinsic motivation? Is extrinsic motivation always bad? The answers are Of Course, Certainly, and Absolutely Not.

Extrinsic motivation is both necessary and desirable under a wide range of circumstances, because there are many positive effects of extrinsic motivation. Under the contraints of deadlines, evaluation expectation, surveillance, contracted-for reward, and so on, work does tend to get done, and it tends to get done on time. Moreover, the technical correctness of work seems not to suffer under extrinsic motivation the way that creativity does. Finally, of course, people have strong needs for the extrinsics of life: monetary rewards and rewards of other kinds, feedback and recognition, and guidelines for behavior.

These facts, though, are not inconsistent with the proposition that the intrinsically motivated state is more conducive to creativity than the extrinsically motivated state. For one thing, there are many tasks where creativity is not an issue; for those straightforward, algorithmic tasks, as McGraw (1978) suggests, extrinsic motivation is quite appropriate. For another thing, intrinsic motivation seems to be crucial only in the response generation stage of the creative process. At the other stages, especially the sometimes laborious preparation and validation stages, extrinsic motivation is quite helpful. And finally, extrinsic and intrinsic motivation are not always mutually exclusive.

The intrinsic-extrinsic motivation model that most theorists adopt (and that I have been presenting thus far) is an overly simplistic hydraulic one: as extrinsic motivation increases, intrinsic motivation (and creativity) must decrease; the two are considered mutually exclusive. But the hydraulic model cannot be the complete story. There is too much naturalistic evidence (e.g., Amabile & Gryskiewicz, 1987) that some people can work under strong extrinsic constraints in organizations and still maintain both their intrinsic motivation and their creativity. There is too much experimental evidence (e.g., Amabile & Hennessey, in press; Amabile et al., 1986) that, under certain conditions, the introduction of external motivators can augment creativity over the baseline intrinsic-motivation levels.

The qualifications in the previous paragraph are crucial. *Some people* can work under strong extrinsic constraints in organizations and still be creative; *under certain conditions*, external motivators may actually augment creativity rather than wiping it out. The key seems to be the initial

motivational orientation of the individual. As described by Calder and Staw (1975), if a person begins with a very low level of intrinsic interest in her work, extrinsic incentives should provide at least some motivation to persist in the work; if a person begins with a moderate level of intrinsic motivation, the hydraulic effect will take over, leading to lower levels of intrinsic motivation as extrinsic incentives are introduced. But what happens when the person begins with a very *high* level of intrinsic motivation (which is probably rare in experimental studies using randomly-chosen subjects from the general population)? If a person has a high level of intrinsic interest in her work, if she is quite aware of that personal interest, and if she continues to see herself as doing the work *primarily* because it is intriguing and challenging to her personally, she is quite likely to maintain that intrinsic motivation (and her creativity) under all but the most extreme extrinsic circumstances. With most levels of extrinsic constraint, as long as the intrinsic motivation was really strong to begin with, motivators such as reward or deadline pressure might simply supply all the more incentive to attack the work. In other words, although the hydraulic model fits for modest levels of initial intrinsic motivation, *under certain conditions,* an *additive* model of intrinsic and extrinsic motivation is more appropriate.

QUALITIES OF ENVIRONMENTS THAT INFLUENCE CREATIVITY

The previous section described the way in which extrinsic constraints can undermine intrinsic motivation and creativity. In an organizational setting, what are the extrinsic constraints that can most seriously undermine an individual's motivation and creativity? In other words, how well do experiments on social environment, motivation and creativity translate into the organizational context? And, going beyond the findings of those experiments, how can environmental factors in organizations *promote* motivation and creativity?

Content analysis of the transcripts in our interview study (Amabile & Gryskiewicz, 1987) revealed 9 qualities of environments that served to promote creativity, and 9 that served to inhibit creativity. I will present them here rank ordered by the percentage of R&D scientists who mentioned them in their stories. The same factors were found for both the bank and the railroad employees, although there was some reordering in the rankings.

Qualities of Environments That Promote Creativity

Note: Numbers in parentheses indicate the percentage of scientists who mentioned the factor at least once.

1. *Freedom* (74%): freedom in deciding what to do or how to accomplish the task, a sense of control over one's own work and ideas. The most important type of freedom, as described by these interviewees, is *operational autonomy* (cf. Bailyn, 1985)—freedom in the day-to-day conduct of one's work, freedom in deciding how to achieve the overall goal or mission of a project. The prominence of freedom in our own research fits closely with the findings of other researchers, most notably Andrews and his colleagues (Andrews & Farris, 1967; Pelz & Andrews, 1966).
2. *Good Project Management* (65%): a manager who serves as a good role model, is enthusiastic, has good communication skills, protects the project team from outside distractions and interference, matches tasks to workers' skills and interests, and sets a clear direction without managing too tightly.
3. *Sufficient Resources* (52%): access to necessary resources, including facilities, equipment, information, funds and people.
4. *Encouragement* (47%): management enthusiasm for new ideas, creating an atmosphere free of threatening evaluation.
5. *Various Organizational Characteristics* (42%): A mechanism for considering new ideas, a corporate climate marked by cooperation and collaboration across levels and divisions, an atmosphere where innovation is prized and failure is not fatal.
6. *Recognition* (35%): a general sense that creative work will receive appropriate feedback, recognition, and reward.
7. *Sufficient Time* (33%): time to think creatively about the problem, to explore different perspectives rather than having to impose an already-determined approach.
8. *Challenge* (22%): a sense of challenge arising from the intriguing nature of the problem itself or its importance to the organization (internalized by the individual as a personal sense of challenge).
9. *Pressure* (12%): a sense of urgency that is internally generated from competition with outside organizations, or from a general desire to accomplish something important.

Qualities of Environments That Inhibit Creativity

Note: Numbers in parentheses indicate the percentage of scientists who mentioned the factor at least once.

1. *Various Organizational Characteristics* (62%): inappropriate reward systems in the organization; excessive red tape; a corporate climate marked by a lack of cooperation across divisions and levels, little regard for innovation in general.
2. *Constraint* (48%): lack of freedom in deciding what to do or how to accomplish the task, lack of sense of control over one's own work and ideas.

3. *Organizational Disinterest* (39%): a lack of organizational support, interest, or faith in a project; a perceived apathy toward any accomplishments coming from the project.
4. *Poor Project Management* (37%): manager unable to set clear direction, manager with poor technical or communication skills, manager who controls too tightly or allows distractions and fragmentation of the team's efforts.
5. (tied rank) *Evaluation* (33%): inappropriate or inequitable evaluation and feedback systems, unrealistic expectations, an environment focused on criticism and external evaluation.
6. (tied rank) *Insufficient Resources* (33%): a lack of appropriate facilities, equipment, materials, funds, or people.
7. (tied rank) *Time Pressure* (33%): insufficient time to think creatively about the problem; too great a workload within an unrealistic time frame; high frequency of "fire-fighting."
8. *Overemphasis on the Status Quo* (26%): reluctance of managers or co-workers to change their way of doing things; an unwillingness to take risks.
9. *Competition* (14%): interpersonal or intergroup activity within the organization, fostering a self-defensive attitude.

The Delicate Balance

Not surprisingly, there are several pairs of clear opposites on the lists of creativity promoters and creativity inhibitors. The most striking example is freedom and constraint. Freedom was the most prominent environmental promoter of creativity, and constraint was the second most prominent environmental inhibitor of creativity. Several other pairs of opposites are apparent. A good project manager is skilled technically and socially, and can successfully protect the project team. The poor manager is unskilled and allows distractions or fragmentation of the team's efforts. Good organizational climate is marked by cooperation and collaboration among different areas of the organization; poor organizational climate is marked by the absence of these factors. And, while sufficient time and sufficient resources serve as stimulants to creativity, insufficient time and insufficient resources serve as obstacles.

Despite the presence of these pairs of clear opposites, not all of the elements in these lists of environmental factors are quite so straightforward. Indeed, much of the information we garnered from these interviews suggests that the appropriate management climate for creativity involves setting a delicate balance in several arenas. Goal setting provides the most striking example. Project managers can stifle creativity if their goal setting is either too loose or too tight. If they fail to provide clear direction for

the project as a whole, if they fail to carefully conceptualize and communicate the overall mission, members of the project team may make fragmented and disjointed efforts (at best) or may fail to make any efforts at all (at worst). On the other hand, if project managers attempt to manage too tightly at the procedural level—the day-to-day carrying out of specific tasks—team members may become demotivated and their efforts may be uninspired rote responses. The delicate goal-setting balance that the manager needs to achieve is the balance between what Pelz and Andrews (1966) call coordination and freedom.

Reward systems also require a balancing act. If employees feel that every move they make is tied to bonuses, awards, salary increases, or promotions, they are unlikely to take risks in trying out new ideas. On the other hand, if there are no rewards for creative efforts, employees may feel that creativity is not valued by the organization. The trick is to establish a reward system that *generously* and *equitably* recognizes and rewards good work (a good effort as well as a good outcome) after it has been produced, without holding out salient rewards as carrots for each phase of each task. If people work in an organization where they have seen creative efforts rewarded in the past, they will feel that there is a value placed on creativity, and that their own work will be rewarded equitably when the time comes.

Evaluation is a similar issue. Evaluation pressure, where people feel threatened by unfavorable performance reviews for failures, can lead to extremely low levels of risk-taking and, as a result, low levels of creativity. On the other hand, people do need to feel that attention is being paid to their work, that management cares about it enough to find out what is going on, and to give constructive feedback. The nature and timing of the feedback are crucial. If employees only find out "how they are doing" once or twice a year in very formal performance appraisal settings, creativity is likely to be undermined. If, however, there is a constant, constructive, less formal exchange of information about a project's progress on the part of all team members and management, evaluation can be seen as useful and supportive.

Pressure presents perhaps the most interesting set of factors to balance. On the list of inhibitors to creativity, we find time pressure and competition (which is another form of pressure). But competition also appears on the list of creativity promoters, as one of a few pressure sources that can actually stimulate creativity; time pressure appears there, too. It appears that a balanced amount of pressure is appropriate to creativity. If there is no sense of time urgency, people may feel that their project is unimportant. If time pressure is too great, it may force people to take the simplest, most unimaginative route. (Recall the maze metaphor.) If competition is perceived as threatening, as is often the case with in-group

competition, creativity will tend to be affected negatively. But positive effects on creativity can result if competition with an outside group or corporation pulls the team closer together. Under these circumstances, the competition may just add to the positive tension of challenge.

REQUIREMENTS FOR A MODEL OF ORGANIZATIONAL INNOVATION

On the basis of nearly four decades of research, psychologists now have reasonable models of individual creativity. I have presented my componential model of individual creativity, based on my own work as well as the work of other researchers. In considering how innovation happens in an organization, it is essential to understand how creativity happens in the individual. Individuals, working alone or in close groups, are the ones who produce the new and useful ideas that may be implemented by the organization. However, as we have seen from the lists of personal and environmental factors that promote and inhibit creativity, individual creativity can be powerfully influenced by elements of the organization. The highest levels of management influence individual creativity by setting the overall organizational climate, including the emphasis on creativity and innovation, by establishing reward and evaluation systems, and by providing or withholding resources for creative efforts. Middle levels of management, and project management, influence individual creativity by establishing and communicating project goals and timeframes, by providing feedback, and by establishing levels of freedom and constraint. Even coworkers influence individual creativity by presenting varying levels of experience, technical expertise, and social skill.

I suggest four criteria for a general model of organizational innovation: *First,* the entire process of individual creativity must be considered as a crucial element in the process of organizational innovation. As I said earlier, it is individual creativity that provides the raw material for organizational innovation and, therefore, individual creativity must be central to the organizational model.

Second, the model must attempt to incorporate all aspects of organizations that influence innovation. These influences, of course, come from sources far beyond the individual or small group responsible for producing the "target" creative idea—the idea that is being implemented. There is considerable evidence that the success or failure of innovation attempts does not rest solely with "creative" departments of an organization (such as R&D), nor with the highest levels of management, nor with the production or the marketing of the innovation. All areas play key roles. A comprehensive model of the innovation process should show the major sources of influence within the organization, and should specify the points at which those influences are most likely to operate.

Third, a model must show the major stages of the organizational innovation process. Certainly, there is no one universal and smooth sequence of steps from initial vision through idea generation through development and final implementation. But it should be possible to identify the major stages through which new and useful ideas usually develop and become implemented in organizations, and the sequence in which those stages most typically occur.

Fourth, a model of organizational innovation must describe the influence of organizational factors on individual creativity. As is clear from the results of our interview study, and the studies of several other researchers cited earlier, a number of elements at all levels of the organization can have a significant impact on individual creativity.

A MODEL OF ORGANIZATIONAL INNOVATION

As I have argued, there will be no innovation in an organization without creative ideas from individuals; you need the ideas before you can develop and implement them. But, clearly, there is a two-way influence between the individual and the organization. What happens in the organization is significantly influenced by individual creators, but individual creators are significantly influenced by what happens in the organization. Once the major influences on individual creativity and organizational innovation have been identified, the next important task is to begin specifying how and where these mutual influences occur.

Figure 2 presents a model of organizational innovation. As will become clear, the model is a preliminary one. It includes a basic skeleton of the innovation process (the sequence at the top of the figure), an outline of the three components that influence that process (in the center of the figure), and an indication of the major influence forces (depicted with arrows). But a complete listing of the elements within each component and a complete accounting of the influences described can only be accomplished with much additional research.

The first thing to note about this model is the prominent inclusion of the process of individual (or small-group) creativity in the overall process of organizational innovation. (Individual or small-group creativity is depicted in the entire bottom section of Figure 2.) As illustrated by the heavy arrow, individual creativity has its major impact at the idea-production stage of the innovation process (stage 3). Certainly, creativity is required of individuals at all stages of the innovation process from initial agenda setting to final outcome assessment. But, for any single innovation process, we are concerned with the implementation of a particular creative idea; it is in stage 3 that this "target idea" comes into being.

The depiction of individual creativity in the bottom section of Figure 2 is identical to the model of individual creativity that was presented in

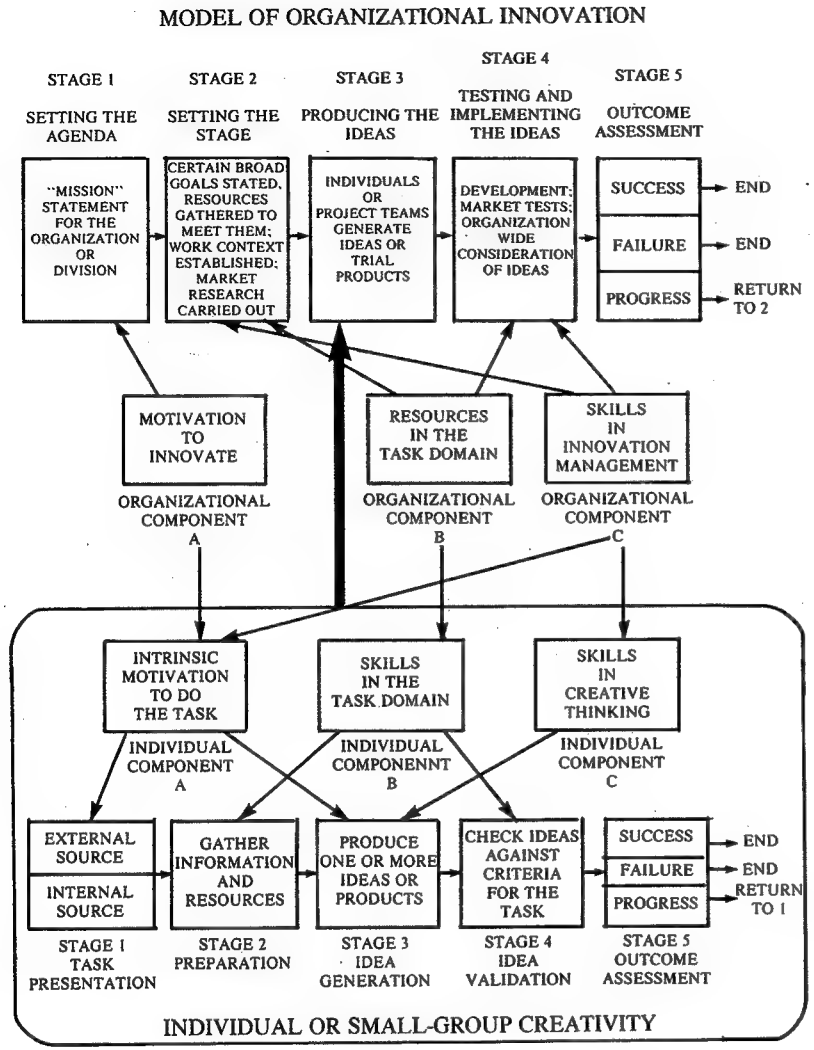

Figure 2. Componential model of organizational innovation. Arrows indicate sequences of steps in the process (top of figure) and the influence of particular factors on others. Only direct and primary influences are depicted here.

Figure 1. Most of the detail of that individual model is replicated here for two reasons: First, to stress the essential role of individual creativity in the process of organizational innovation. Second, to enable depiction of the influence of factors in the *organizational* environment on the components of *individual* creativity.

The three basic components of organizational innovation are depicted in the center of Figure 2. These components are intended to include all facets of the organization that might possibly have an impact on the success of an innovation attempt, in other words, all facets of the organization. The elements that make up these components can be enumerated from the results of previous research on specific organizational factors that influence individual creativity and/or other facets of the organizational innovation process. Each of these components is essential for an organization to be innovative in its field.

Rather than being categorized according to functional units within the organization (as in many other models of the innovation process), these components of innovation include a mix of elements at different levels and in different functional areas of the organization. Moreover, each of these components impacts the innovation process at more than one point. In presenting influences on innovation in this way, I have attempted to capture the rich and complex nature of the process. Van de Ven (1986) says that this rich complexity is metaphorically described by the concept of a hologram—a structure that places the essential elements of the whole into each of its parts. "The hologram metaphor emphasizes that organization design for innovation is not a discrete event but a process for integrating all the essential functions, organizational units, and resources needed to manage an innovation from beginning to end" (p. 599).

Motivation to Innovate

This component is made up of the basic orientation of the organization toward innovation. That orientation must come, primarily, from the highest levels: the chairman, president, CEO. The role of middle management in the motivation to innovate can also be important, however. These levels of management are often responsible for communicating and interpreting the orientation of those at the highest levels.

The motivation to innovate can be thought of as a corporate vision; ideally, the president (or chairman, or CEO) envisions a future for the organization that rests on innovation, then formulates that vision into a concise and compelling communication. The overall goal of innovation is clear, and most likely, the general areas of innovation are part of the mission statement. On the basis of existing information (Amabile & Gryskiewicz, in press; Cummings, 1965; Hage & Dewar, 1973; Havelock,

1970; Kimberley, 1981; Kanter, 1983), it appears that the most important elements of the motivation to innovate are: a value placed on innovation in general, an orientation toward risk (versus an orientation toward maintaining the status quo), a sense of pride in the organization's members and what they are capable of doing, and an offensive strategy of taking the lead toward the future (versus a defensive strategy of simply wanting to protect the organization's past position).

A few of the environmental factors identified in our interview study clearly fit within this motivation to innovate component. On the positive side, there was the organizational climate where (a) innovation is valued, (b) enthusiasm is expressed, and (c) support is extended for meaningful risk-taking and exploration of new ideas. On the negative side, there was organizational disinterest in new undertakings, and an overemphasis on maintaining the status quo.

Resources in the Task Domain

This component includes everything the organization has available to aid work in the task domain. The task domain is the general area that has been targeted for innovation. These resources include a wide array of elements: people with knowledge of the feasibility of implementing particular innovations, people who have familiarity with relevant markets, people with other types of relevant experience in the domain, funds allocated to this work domain, material resources (such as existing means of production within the organization), systems of production, market research resources, data bases of relevant information, and the availability of personnel training in relevant areas. These various resources can be found in a variety of departments and divisions within organizations, including finance, manufacturing (or the equivalent function), personnel, training, and organizational development, in addition to the more traditional "creative" areas such as R&D.

Perhaps because the necessity of resources is so obvious, it has received relatively less research attention than the management-style factors. But the importance of resources was clear in our own research (Amabile & Gryskiewicz, in press). There, sufficient resources ranked as the third most prominent environmental promoter of creativity, and insufficient resources ranked as the sixth most prominent environmental inhibitor.

Skills in Innovation Management

This component includes management at both the level of the organization as a whole and the level of individual departments and projects. By far, there is more research evidence about the elements in this component than the other two combined. Management skills and styles that

are conducive to individual creativity and other facets of the organizational innovation process include: an appropriate balance between freedom and constraint (Amabile & Gryskiewicz, 1987; Andrews & Farris, 1967; King & West, 1985; Pelz & Andrews, 1966; Peters & Waterman, 1982; West, 1986); goal-setting that is tight at the level of overall missions and outcomes, but loose at the level of procedural progress toward those goals (Amabile & Gryskiewicz, 1987; Bailyn, 1985); in a related vein, management that is participative and collaborative (Kanter, 1983; Kimberley, 1981); work assignments that are matched well to both skills and interests (Amabile & Gryskiewicz, 1987); open communication systems for top-down, bottom-up, and lateral communication (Amabile & Gryskiewicz, 1987; Cummings, 1965; Kanter, 1983); frequent, constructive, and supportive feedback on work efforts (Amabile & Gryskiewicz, 1987; Kanter, 1983; Peters & Waterman, 1982; Ashford & Cummings, 1985); equitable and generous reward and recognition of creative efforts as well as creative successes (in addition to the traditional tangibles of awards, money, and advancement, the reward system should abundantly include intrinsic rewards such as increased autonomy in selection of work assignments, increased autonomy concerning work scheduling and methods, and enhanced opportunities for professional growth) (Amabile & Gryskiewicz, 1987; Ashford & Cummings, 1985; Cummings, 1965; Kanter, 1983; Peters & Waterman, 1982); diffuse decision influences, where the input of many people is sought on crucial decisions (Kanter, 1983; Meyer, 1982; Zaltman et al., 1973); an absence of most formal and complex management structures (Kimberley, 1981); managers who are models of professionalism (Kimberley, 1981); an absence of unnecessary layers of hierarchy (Kanter, 1983); abundant access to power tools for innovative problem solving (Kanter, 1983); an absence of both internal competition and frequent threatening evaluation (Amabile & Gryskiewicz, 1987; Kanter, 1983); an absence of excessive arbitrary time pressures (Amabile & Gryskiewicz, 1987); enthusiastic support and frequent collaboration between groups, departments, and divisions (Amabile & Gryskiewicz, 1987).

The Creativity Intersection

The three components of organizational innovation are analogous to the three components of individual creativity discussed earlier. At both the individual level and the organizational level, there is a *Resources* component; these are the raw materials available for creativity or innovation in a particular domain. For the individual, resources are found in the *domain-relevant skills* component; they consist of basic talent in the domain, as well as acquired knowledge and technical skill in the domain. For the organization, *resources in the task domain* consist of funds, materials,

systems, people, and information available to aid work in the identified task domain. In other words, for both the individual and the organization, resources are the essential elements for doing work in a particular domain.

But the elements themselves are not enough. They can be used creatively or uncreatively by the individual; they can be operated upon innovatively or noninnovatively by the organization. *Techniques* are the skills necessary for creative work by the individual or innovative outcomes from the organization. Without these skills, the individual will produce ordinary ideas (appropriate but not novel), and the organization will fail in innovation attempts, either because of a lack of creative ideas from individuals, or an inability to successfully implement those ideas. For the individual, these crucial techniques are the *creativity-relevant skills*—styles of thinking, styles of working, styles of approaching the world that are likely to lead to novel and useful ideas. For the organization, the crucial techniques are *skills in innovation management*—management skills at all levels of the organization that nurture the conception, development, and implementation of creative ideas. For both the individual and the organization, the techniques *operate on* the resources.

In a sense, motivation is the most important of the three components, both for the individual and for the organization. I argued earlier that, for the individual, domain-relevant skills and creativity-relevant skills determine what he or she is capable of doing, but the presence or absence of *intrinsic task motivation* will determine what that individual actually does. The same is true of the organization. Resources in the task domain and skills in innovation management make innovation possible, but the necessary catalyst is the *motivation to innovate,* the forward-looking, risk-oriented vision that comes from the highest level of the organization.

Figure 3 is a schematic representation of the three component types for individual creativity or organizational innovation. As argued earlier, some minimal level of each of the three components is necessary for any individual creativity or organizational innovation. The higher the level of each of the three components, the greater the overall final level of individual creativity or organizational innovation should be.

The components can be conceptualized as circles that overlap to a greater or lesser extent (see Figure 3). One important insight gained by conceptualizing them in this way is that creativity (or innovation) will be greatest in that area where all three components overlap. This "*creativity intersection*" defines the area of highest probability for individual creativity or organizational innovation.

For both the individual and the organization, then, all three elements are crucial. The greater the areas of overlap between resources, techniques for using those resources, and motivation, the greater the probability of true creativity and successful innovation.

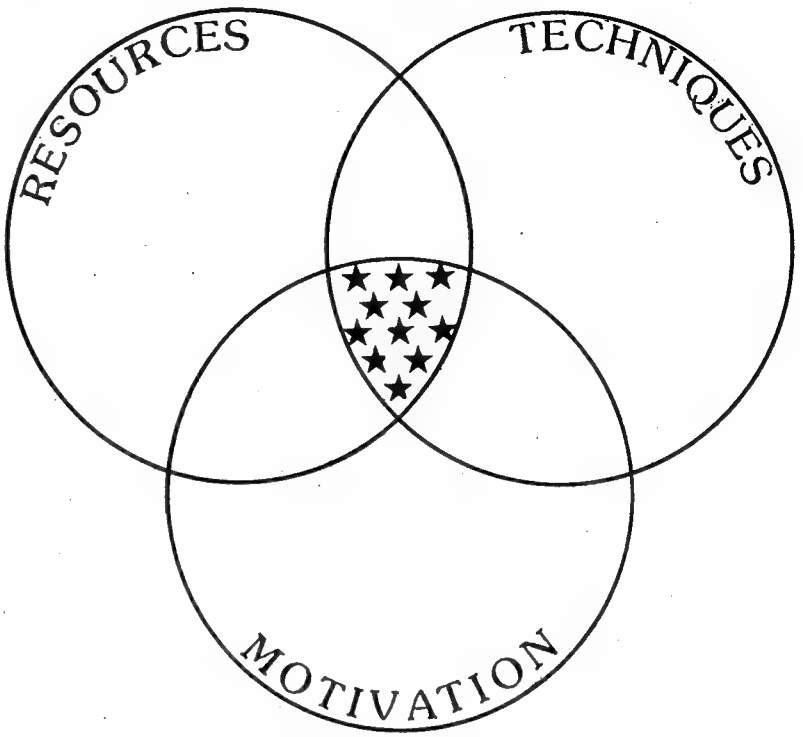

Figure 3. The Creativity Intersection: the area of overlap between resources, techniques, and motivation. This is the area of highest creativity for individuals and highest innovation for organizations.

Stages of the Organizational Innovation Process

Nearly all previous models of the organizational innovation process have been stage models, describing a sequence of phases through which innovations proceed (cf. Schroeder, Van de Ven, Scudder, & Polley, 1986). In a recent review, Saren (1984) classifies models of the innovation process according to five types: (1) departmental-stage models, (2) activity-stage models, (3) decision-stage models, (4) conversion process models, and (5) response models.

Departmental-stage models (e.g., Robertson, 1974) break down the process into a series of stages associated with departments of the organization—for example, (1) R&D; (2) design; (3) engineering; (4) production; and (5) marketing. According to such models, the innovation moves from

its conception as an idea through various departments in sequence, until it finally emerges into the market as a new product.

Activity-stage models are by far the most frequent type (e.g., Baker & McTavish, 1976; Granstrand & Fernlund, 1978; King, 1973; Rothwell & Robertson, 1973; Utterback, 1974). These models identify particular activities that are performed during innovation. A good example of such a model is that proposed by Cummings and O'Connell (1978): (1) initiation of the process; search for the source of the problem; (2) generation of alternative innovative proposals; (3) evaluation of alternatives innovation proposals; (4) selection and initiation of an alternative (or set of alternatives); and (5) acceptance and routinization.

Decision-stage models (e.g., Cooper & More, 1979; Rubenstein & Ettlie, 1979) break down the process into a series of decisions with a set sequence of steps that must occur at each decision point—for example, (1) gathering information to reduce uncertainties, (2) evaluation of information, (3) decision making, and (4) identification of remaining key uncertainties.

Conversion process models (e.g., Schon, 1967; Twiss, 1980) treat innovation as a system in terms of outputs and inputs rather than an orderly, logical process. In one such model, for example (Twiss, 1980), technological innovation is seen as a conversion process that transforms inputs, such as raw materials, scientific knowledge, and manpower, into outputs—new products. Inputs may take the form of activities, information, and departments of the organization. The organization is seen as a user of inputs of various types, but the order or sequence of such use remains unspecified.

Response models (e.g., Becker & Whisler, 1967) represent innovation as the organization's "response" to some external or internal stimulus—for example, (1) stimulus on individuals in an organization to conceive a new idea; (2) conception of the idea for an innovation; (3) proposal by the inventor of a project for development; and (4) adoption of the innovation.

Schroeder and his colleagues (1986) are skeptical about the validity of dividing the innovation process into stages because, as their research suggests, "managing innovation is like directing controlled chaos" (1986, p. 15). However, most innovation theorists have found the stage approach useful in clarifying the various variables operating on innovation. I agree that a stage approach can have great heuristic value; it is important, for both theory and practice, to describe the major phases in the life-span of idea implementation—beginning even before idea conception—as well as the major influences on those phases.

Before describing what the present model says and what it does, let me mention what it does *not* do. (1) It does not depict the influence of all factors at all points in the innovation process. The arrows depicting the influence of organizational components on the organizational process and on the individual process probably capture only the major and most obvious influences. (2) The model treats the organization as a self-contained unit. It explicitly includes only factors that can be found within the organization—factors of resources, techniques, and motivation in the individuals employed by the organization, and in the organizational culture as a whole. But forces outside the organization, such as foreign competition, changes in government regulations, fluctuations in the economy and in consumer preferences, or even weather patterns, can have a significant impact on the progress of the innovation process and its ultimate success. A comprehensive model of organizational innovation must eventually account for these external influences on the process. (3) The sequence depicted in the model is limited to one "target idea" being chosen and implemented. It does not show what happens when several ideas are produced and pursued simultaneously. (4) The model does not show what happens after the initial target idea has been implemented; it does not consider the long-term effects of innovations.

The model I will present has much in common with previous models, particularly the "activity-stage models" in Saren's (1984) categorization scheme. However, this model goes beyond earlier representations in meeting the criteria I established earlier. Most importantly, this model includes a detailed consideration of the entire process of individual creativity, as well as the organizational factors that influence it. In addition, while describing stages that are similar to most earlier process models, this model attempts to incorporate all aspects of organizations that influence innovation in a fluid manner that is not restricted to categorizations within organizational hierarchy or functional unit.

The sequence at the top of Figure 2 is my schematic representation of the componential model of the organizational innovation process. This model describes the way in which an organization might assemble and use resources in producing a product, process, service, or internal administrative system. The executive controlling function resides with the motivation to innovate component; it is this component within the organization that generally initiates the innovation process. Resources in the task domain are the raw materials drawn upon in establishing a context for the project, and in testing, developing, and implementing ideas generated. Skills in innovation management, as we will see, are important throughout the entire process.

The process outlined at the top of Figure 2 applies to both high and low levels of innovation. The final level of innovation will depend on the levels of each of the three organizational components (resources in the task domain, skills in innovation management, and motivation to innovate) *and* on the level of creativity produced by the individuals working on the

project (which, of course, depends on their individual levels of domain-relevant skill, creativity-relevant skill, and intrinsic task motivation). As I suggested earlier, the processes of individual creativity and organizational innovation are clearly interdependent.

Stage 1 of the organizational innovation process is called "setting the agenda." In this stage, a mission statement is presented for the organization (or perhaps, in a large organization, for a division). This statement sets an overall direction and presents some general goals that fit in with that direction. Often, such statements can be presented as the "corporate vision," and (as depicted by the arrow) these stage 1 activities are primarily influenced by the *motivation to innovate* component—the orientation toward innovation in the highest levels of management. Schroeder, et al. (1986) have empirically demonstrated the crucial role of top management early in the innovation process. They have also found that the impetus to innovate is often a "shock" of some sort—such as the sudden appearance of a market opportunity or the sudden realization of a business crisis; these shocks are quite often initially perceived and communicated by top management.

In the second phase of the process, the stage is set. Project goals are specified more clearly by high-level management and middle management, but those goals are still somewhat broad. For example, if the overall mission statement in stage 1 was "Within 3 years, we will become the number one provider of the next generation of semiconductor chips," the broad project goal in stage 2 might be, "Within 1 year, we will have a working prototype that meets these general specifications. . ." Also at this stage, the organization is mobilized to enable creative idea-generation to take place. The external environment (outside the organization) may be assessed, to determine the feasibility of different avenues of approach. Work groups or project teams are established at this stage. And, within the usual "rules of the game" for the organization (communication and power channels, evaluation procedures, reward and recognition systems, autonomy allowances), the rules of the game for this particular project are set down.

Importantly, the rules of the game for a particular project *may* be different in substantial ways from the usual rules within the organization. For example, an organization might usually have strict evaluation and accountability procedures, wherein each individual's performance is judged on a formal periodic basis. But the highest levels of management, or middle management, or even project management (if granted sufficient autonomy) might decree that evaluation will work differently for this particular project. Perhaps the progress of the project team will be evaluated as a whole, on a less formal basis, and perhaps a strong element of frequent self-evaluation by the team will be included.

In this very crucial sense, managers can establish a *creativity oasis* for potentially creative individuals within the desert of an organization that is usually hostile to creative enterprises. If those managers are able to adequately buffer members of the project team from those environmental factors that inhibit creativity, they can significantly increase the probability of creative idea-generation in stage 3.

Clearly, as depicted by the influence arrows in Figure 2, stage 2 depends on all of those skills in innovation management described earlier. It also depends on the availability of resources in the task domain. If those resources (of money, people, systems, and information) already exist in abundance within the organization, stage 2 will progress much more smoothly than if they do not.

It is in stage 3 that individuals or project teams produce the ideas. This stage is, of course, influenced by everything discussed earlier as having an effect on the process of individual or small-group creativity: the individuals' skills in the task domain, skills in creative thinking, and intrinsic motivation to do the task.

An examination of existing data on creativity in organizations (much of which was reviewed earlier) makes it clear that creative idea generation by individuals and small groups is also influenced by many features of the organizational environment. Specifically, each of the components of individual creativity is influenced by one or more of the organizational components. The individual's skills in the task domain can be developed by information available within the organization and by formal training which may be provided by the organization, both of which are organizational resources in the task domain. (This is depicted in Figure 2 as organizational component B influencing individual component B.) The individual's skills in creative thinking, such as an orientation toward risk, can be strengthened and made more habitual by the strong presence of innovation management skills, such as an acceptance and encouragement of risk taking, within his or her supervisors (in Figure 2, organizational component C influencing individual component C).

Perhaps most importantly, though, the individual's intrinsic motivation to do a task can be strongly influenced by factors in the organizational environment. If people perceive that they are working in an environment where project goals are clear, challenging, and personally interesting, where they are given autonomy in deciding how to achieve project goals, where their new ideas are met with encouragement and enthusiasm, where they are not burdened with impossible project schedules or resource limitations, where others in the organization willingly cooperate in achieving project goals, where their best efforts will be recognized and rewarded, and, above all, where creativity is valued, then they will work with high levels of intrinsic motivation, and they will produce creative ideas. In

other words, the individual's intrinsic motivation can be influenced not only by one's own initial spark of interest in the task, but also by everything in the organization that might lead that initial interest to sputter away or to burn even more brightly.

This means that individual intrinsic motivation can be influenced by the organizational components of motivation to innovate and skills in innovation management (at all levels). (As shown in Figure 2, individual component A is influenced by both organizational component A and organizational component C.) Of all the links in the overall model, these are the ones that are most clearly illuminated by my own program of research (cf. Amabile, 1983; Amabile, 1985; Amabile et al., 1986; Amabile & Gryskiewicz, 1987).

Figure 2 illustrates an idealized sequence, which may not even be the modal sequence in which the innovation process unfolds. One deviation is a frequent backflow from stage 4 to stage 3 and back to stage 4 again. The second common deviation from the sequence depicted in Figure 2, and the more serious one, is that stage 3 often seems to appear first. Individuals or small groups often generate ideas that come not from some project context established in direct response to a top-level directive, but from the special interests of the individuals themselves, unexpected insights they might encounter through the course of other work or even outside of work, or sheer serendipity—a lucky accident that was seen as important by some alert individual. Often, the small "skunkwork" groups that generate and develop such ideas "out of whole cloth" do so without the awareness of the formal organization, and sometimes against explicit management directives (Peters, 1983).

Stage 4 involves testing and carrying out the ideas. It is here that the "implementation" part of the innovation definition appears most prominently. In most cases, it is inevitable that other facets of the organization become involved, beyond the initial individual or group that generated the creative ideas. Prototypes may be perfected, technical tests and market tests conducted, and input from every area of the organization considered. Skills in innovation management are crucial at this stage, because it is here that a good idea can die either from lack of proper nourishment or from active sabotage by elements of the organization that might not wish to see the innovation succeed. Resources in the task domain are also important, because it is often the case that more personnel, money, material systems, and information are needed at this stage than at any other stage of the process. (In Figure 2, arrows depict these influences of organizational component B and organizational component C on stage 4.)

The final stage, stage 5, is outcome assessment. After preliminary attempts at implementing the new idea, progress is evaluated. If there is

complete success—if the new product, process, or service is being successfully produced, or the new administrative procedures have been accepted and found to work—the process ends. Perhaps other, similar processes will then be initiated. If there is complete failure, if no reasonable ideas were generated for implementation, or if the implementation yielded no progress, the process will also, most likely, end. But if there is some progress without complete success, which is probably the most common outcome, there may be a cycling back to stage 2, with a reformulation of an attack on the problem. A number of indicators can be used in this final assessment stage, including cost, projected return on investment, efficiency, risk and uncertainty, complexity, and status quo increment (Zaltman et al., 1973).

CONCLUDING IMPLICATIONS

Having been derived principally from data on factors that influence creativity and innovation, the componential model of organizational innovation that I have presented leads to several implications for practice—all of which can and should be given further empirical examination. Three of these implications can be derived directly from a consideration of the "Creativity Intersection" notion, a notion applicable both to individual creativity and to organizational innovation (see Figure 3). First, when hiring personnel *and* when assigning personnel to tasks, it is important to look not only for skills (skills in the task domain and skills in creative thinking), but also for intrinsic motivation. Qualified people who are personally intrigued and challenged by the task will be more likely to produce creative work than qualified people who are not so motivated.

The remaining two implications concern keeping that intrinsic motivation alive once we have selected people who have it. Using the information already available on the environmental factors that stimulate creativity, we can fortify and expand those elements wherever they exist in organizations. Surely, most organizations, no matter how unpromising the general atmosphere might be for creativity, have at least some germ of a creativity oasis in them. Finally, we can use the information already available on the organizational environment factors that inhibit creativity, and restructure, reduce, or eliminate those elements wherever they exist in organizations. This point is deceptively simple; the action it suggests can have powerful results. In organizational innovation, as in many things, putting some positive new thing into place might often be more burdensome and less effective than simply removing something that's been standing in the way.

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REFERENCES

Amabile, T.M. (1979). Effects of external evaluation on artistic creativity. *Journal of Personality and Social Psychology, 37,* 221–233.

Amabile, T.M. (1982a). Children's artistic creativity: Detrimental effects of competition in a field setting. *Personality and Social Psychology Bulletin, 8,* 573–578.

Amabile, T.M. (1982b). Social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology, 43,* 997–1013.

Amabile, T.M. (1983a). *The social psychology of creativity.* New York: Springer-Verlag.

Amabile, T.M. (1983b). Social psychology of creativity: A componential conceptualization. *Journal of Personality and Social Psychology, 45,* 357–377.

Amabile, T.M. (1985). Motivation and creativity: Effects of motivational orientation on creative writers. *Journal of Personality and Social Psychology, 48,* 393–399.

Amabile, T.M., & Gitomer, J. (1984). Children's artistic creativity: Effects of choice in task materials. *Personality and Social Psychology Bulletin, 10,* 209–215.

Amabile, T.M., Goldfarb, P., & Brackfield, S. (1982). Effects of social facilitation and evaluation on creativity. Unpublished manuscript, Brandeis University, Waltham, MA.

Amabile, T.M., & Gryskiewicz, S.S. (1987). *Creativity in the R & D laboratory.* Technical Report Number 30. Greensboro, N.C.: Center for Creative Leadership.

Amabile, T.M., & Hennessey, B.A. (in press). The motivation for creativity in children. In A.K. Boggiano & T. Pittman (Eds)., *Achievement and motivation: A social-developmental perspective.* New York: Cambridge University Press.

Amabile, T.M., Hennessey, B.A., & Grossman, B.S. (1986). Social influences on creativity: The effects of contracted-for reward. *Journal of Personality and Social Psychology, 50,* 14–23.

Andrews, F.M., & Farris, G.F. (1967). Supervisory practices and innovation in scientific teams. *Personnel Psychology, 20,* 497–575.

Ashford, S.J., & Cummings, L.L. (1985). Proactive feedback seeking: The instrumental use of the information environment. *Journal of Occupational Psychology, 58,* 67–80.

Bailyn, L. (1985). Autonomy in the industrial R&D laboratory. *Human Resource Management, 24,* 129–146.

Baker, M.J., & McTavish, R. (1976). *Product policy and management.* New York: Macmillan.

Barron, F. (1955). The disposition toward originality. *Journal of Abnormal and Social Psychology, 51,* 478–485.

Barron, F. (1968). *Creativity and personal freedom.* New York: Van Nostrand.

Becker, S.W., & Whisler, T.L. (1967). The innovative organization: A selective view of current theory and research. *The Journal of Business,* 462–469.

Calder, B.J., & Staw, B.M. (1975). The self-perception of intrinsic and extrinsic motivation. *Journal of Personality and Social Psychology, 31,* 599–605.

Campbell, D. (1960). Blind variation and selective retention in creative thought as in other knowledge processes. *Psychological Review, 67,* 380–400.

Cattell, R.B., & Butcher, H.J. (1968). *The prediction of achievement and creativity.* New York: Bobbs-Merrill.

Cooper, R.G., & More, R.A. (1979). Modular risk management: An applied example. *R&D Management, 9,* 93–99.

Cummings, L. (1965). Organizational climates for creativity. *Journal of the Academy of Management, 8,* 220–227.

Cummings, L.L., & O'Connell, M.J. (1978). Organizational innovation: A model and needed research. *Journal of Business Research, 6,* 33–50.

Deci, E.L. (1975). *Intrinsic motivation.* New York: Plenum.

Deci, E.L., & Ryan, R.M. (1985). *Intrinsic motivation and self-determination in human behavior.* New York: Plenum.

Delbecq, A.L., & Mills, P.K. (1985). Managerial practices that enhance innovation. *Organizational Dynamics, 14,* 24–34.

Drucker, P.F. (1985). *Innovation and entrepreneurship: Practice and principles.* London: Heinemann.

Feldman, D. (1980). *Beyond universals in cognitive development.* Norwood, NJ: Ablex.

Findlay, C.S., & Lumsden, C.J. (in press). The creative mind: Toward an evolutionary theory of discovery and innovation. *Journal of Social and Biological Structures.*

Golann, S.E. (1963). Psychological study of creativity. *Psychological Bulletin, 60,* 548–565.

Gordon, W.W. (1961). *Synectics: The development of creative capacity.* New York: Harper & Row.

Granstrand, O., & Fernlund, I. (1978). Co-ordination of multinational R and D: A Swedish case study. *R&D Management, 9,* No. 1.

Hage, J., & Aiken, M. (1967). Program change and organizational properties: A comparative analysis. *American Journal of Sociology, 72,* 503–519.

Hage, J., & Dewar, R. (1973). Elite values versus organizational structure in predicting innovation. *Administrative Science, 18,* 279–290.

Harter, S. (1978). Effectance motivation reconsidered: Toward a developmental model. *Human Development, 21,* 34–64.

Harvey, E., & Mills, R. (1970). Patterns of organizational adaptation: A political perspective. In M.N. Zald (Ed.), *Power in organizations.* Nashville, TN: Vanderbilt University Press.

Havelock, R.G. (1970). *Planning for innovation.* Ann Arbor: Center for Research on Utilization of Scientific Knowledge, University of Michigan.

Hogarth, R. (1980). *Judgement and choice.* Chichester: Wiley.

Kanter, R.M. (1983). *The change masters.* New York: Simon and Schuster.

Kimberley, J.R. (1981). Managerial innovation. In P.C. Nystrom & W.H. Starbuck (Eds.), *Handbook of organizational design.* Oxford: Oxford University Press.

Kimberley, J.R., & Evanisko, M.J. (1981). Organizational innovation: The influence of individual, organizational and contextual factors on hospital adoption of technological and administrative innovations. *Academy of Management Journal, 24,* 689–713.

King, S. (1973). *Developing new brands.* New York: Pitman.

King, N., & West, M.A. (1985). Experiences of innovation at work. SAPU Memo No. 772, University of Sheffield, Sheffield, England.

Koestner, R., Ryan, R.M., Bernieri, F., & Holt, K. (1984). Setting limits on children's behavior: The differential effects of controlling versus informational styles on intrinsic motivation and creativity. *Journal of Personality, 52,* 233–248.

Kruglanski, A.W., Friedman, I., & Zeevi, G. (1971). The effects of extrinsic incentive on some qualitative aspects of task performance. *Journal of Personality, 39,* 606–617.

Lepper, M.R., & Greene, D. (1978). *The hidden costs of reward.* Hillsdale, NJ: Lawrence Erlbaum Associates.

MacKinnon, D.W. (1962). The nature and nurture of creative talent. *American Psychologist, 17,* 484–495.

MacKinnon, D.W. (1965). Personality and the realization of creative potential. *American Psychologist, 20,* 273–281.
March, J., & Simon, H. (1958). *Organizations*. New York: Wiley.
McGraw, K. (1978). The detrimental effects of reward on performance: A literature review and a prediction model. In M.R. Lepper & D. Greene (Eds.), *The hidden costs of reward*. Hillsdale, NJ: Lawrence Erlbaum Associates.
McGraw, K., & McCullers, J. (1979). Evidence of a detrimental effect of extrinsic incentives on breaking a mental set. *Journal of Experimental Social Psychology, 15,* 285–294.
McGuire, W. (1973). The yin and yang of progress in social psychology. *Journal of Personality and Social Psychology, 26,* 446–456.
Milo, N. (1971). Health care organizations and innovations. *Journal of Health and Social Behavior, 12,* 163–173.
Myers, S., & Marquis, D.G. (1969). *Successful industrial innovations*. National Science Foundation, NSF 69–17.
Newell, A., Shaw, J., & Simon, H. (1962). The processes of creative thinking. In H. Gruber, G. Terrell, & M. Wertheimer (Eds.), *Contemporary approaches to creative thinking*. New York: Atherton Press.
Newell, A., & Simon, H. (1972). *Human problem solving*. Englewood Cliffs, NJ: Prentice-Hall.
Nystrom, H. (1979). *Creativity and innovation*. London: Wiley.
Osborn, A. (1963). *Applied imagination: Principles and procedures of creative thinking*. New York: Scribner's.
Pelz, D.C., & Andrews, F.M. (1966). *Scientists in organizations*. New York: Wiley.
Peters, T.J., & Waterman, R.H. (1982). *In search of excellence: Lessons from America's best run companies*. New York: Harper and Row.
Robertson, A. (1974). *Innovation Management*. Management Decision Monograph, Vol. 12, No. 6.
Rogers, C. (1954). Towards a theory of creativity. *ETC: A Review of General Semantics, 11,* 249–260.
Rothwell, R., & Robertson, A.B. (1973). The role of communications in technological innovation. *Research Policy, 2,* 204–225.
Rubinstein, A.H., & Ettlie, J.E. (1979). Innovation among suppliers to automobile manufacturers: An exploratory study of barriers and facilitators. *R&D Management, 9,* 65–76.
Salancik, G. (1975). *Retrospective attribution of past behavior and commitment to future behavior*. Unpublished manuscript, University of Illinois.
Schon, D.A. (1967). *Technology and change*. New York: Pergamon.
Saren, M.A. (1984). A classification and review of models of the intra-firm innovation process. *R&D Management, 14,* 11–24.
Schroeder, R., Van de Ven, A., Scudder, G., & Polley, D. (1986). *Observations leading to a process model of innovations*. Strategic Management Research Center Discussion Paper #48, University of Minnesota.
Shepard, H.A. (1967). Innovation-resisting and innovation-producing organizations. *Journal of Business, 40,* 470–477.
Simon, H. (1966). Scientific discovery and the psychology of problem solving. In *Mind and cosmos: Essays in contemporary science and philosophy*. Pittsburgh: University of Pittsburgh Press.
Simon, H. (1967). Understanding creativity. In C. Gowan, G. D. Demos, & E.P. Torrance (Eds.), *Creativity: Its educational implications*. New York: Wiley.
Simon, H. (1978). Information-processing theory of human problem-solving. In W.K. Estes (Ed.), *Handbook of learning and cognitive processes, Vol. 5: Human information processing*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Simon, H. (1983). Proceedings of the National Academy of Sciences, *USA, 80,* 4569–4571.
Stein, M.I. (1974). *Stimulating creativity, Vol. 1*. New York: Academic Press.
Stein, M.I. (1975). *Stimulating creativity, Vol. 2*. New York: Academic Press.
Twiss, B.C. (1980). *Managing technological innovation,* second edition. London: Longman.
Utterback, J.M. (1974). Innovation in industry and the diffusion of technology. *Science,* February 15, 620–626.
Van de Ven, A.H. (1986). Central problems in the management of innovation. *Management Science, 32,* 590–607.
Wallach, M., & Kogan, N. (1965). *Modes of thinking in young children*. New York: Holt, Rinehart, & Winston.
Wallas, G. (1926). *The art of thought*. New York: Harcourt, Brace.
West, M.A. (1986). *Role innovation in the world of work*. Memo no. 670, MRC/ESRC Social and Applied Psychology Unit, University of Sheffield, Sheffield, England.
West, M.A., Farr, J.L., & King, N. (1986). Innovation at work: Definitional and theoretical issues. In J.L. Farr (Chair), *Innovation and creativity in work organizations*. Symposium conducted at the meeting of the American Psychological Association, Washington, D.C.
White, R. (1959). Motivation reconsidered: The concept of competence. *Psychological Review, 66,* 297–323.
Wilson, J.Q. (1966). Innovation in organizations: Notes toward a theory. In J.D. Thompson (Ed.), *Approaches to organizational design*. Pittsburgh: Pittsburgh University Press.
Zaltman, G., Duncan, R., & Holbeck, J. (1973). *Innovations and organizations*. London: Wiley.